

# Lecture 10 - Competitive Markets: Applications

ECON 3070 - Intermediate Microeconomic Theory

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March XX, 2025

# Overview

In the previous chapter, we defined a perfectly competitive market, and learned how to calculate short-run and long-run equilibria

- We discussed the long-run equilibrium outcome (zero profit)

In this chapter, we will look at the impact of government interventions in perfectly competitive markets

- These include taxes and subsidies, prices floors and ceilings, and production quotas

# Introduction

In this chapter, we will be considering the impacts of government interventions in a specific market.

- However, we will ignore spillover effects of these interventions into other markets

That is, we will be considering the partial equilibrium effects, as opposed to the general equilibrium effects

- A **partial equilibrium** approach focuses only on a single market (for example, the housing market).
- A **general equilibrium** approach considers how changes in that market might affect other markets.

# Introduction

We will also be ignoring any potential externalities.

An **externality** is a cost or benefit borne on a third party, which is not reflected in the price of the product in that market.

- For example, pollution from cars, or herd effects of vaccination.

# The Invisible Hand

Why is a competitive market economically efficient (surplus maximizing)?

**When the demand curve is above the supply curve, there is a consumer who is willing to pay more for the good than it costs to produce.**

- If additional units are sold, consumer and/or producer surplus will increase.

# The Invisible Hand

**But if the demand curve is below the supply curve, additional consumers receive less benefit from the good than it costs to produce.**

- If additional units are sold, consumer and/or producer surplus will decrease.

# The Invisible Hand

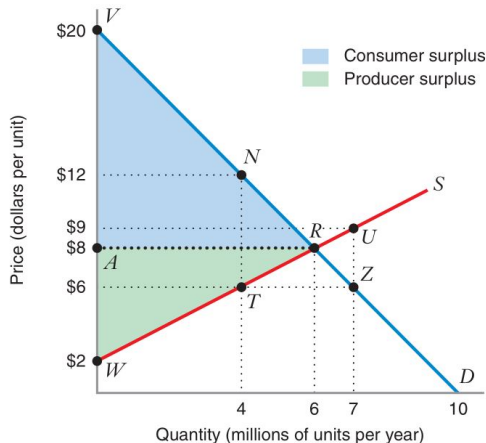
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In a competitive market, there is no central planner arranging transactions.

- Yet decentralized decision-making by individual consumers and producers maximizes total surplus...
- As if the economy is guided by an *invisible hand*.

# The Invisible Hand



- Notice that all trades where Willingness to Pay  $>$  Marginal Cost occur
- And no sale where  $WTP < MC$  occurs
- Thus, the market is maximizing total surplus



# Excise Taxes

An **excise tax** is a tax on a specific commodity, such as gasoline, tobacco, or tea.

- In the absence of a tax, the price paid for the good by the consumer will equal the price received by the producer.
- That is,  $Q_d(P) = Q_s(P)$ .

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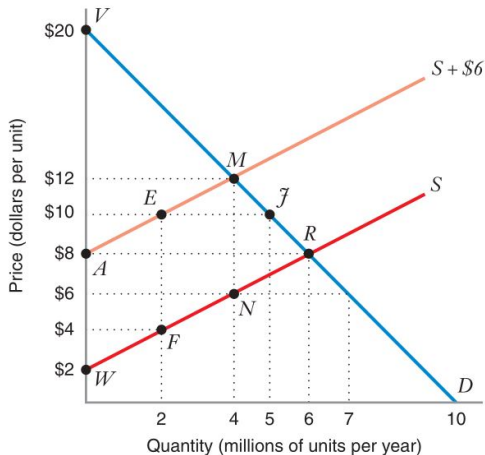
- In the absence of a tax, the price paid for the good by the consumer will equal the price received by the producer.
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However, when a tax is imposed, it creates a “tax wedge” between the price paid and the price received.

For example, if the government imposes a \$6 tax on gasoline, then

$$P_s = P_d - 6 \text{ or } P_s + 6 = P_d$$

# Excise Tax



- The shifted supply curve intersects demand at  $M$  with  $Q = 4$  and a price of  $P_d = \$12$ .
- However, the seller only receives  $P_s = \$6$  at the point  $N$  because of the tax

# Excise Taxes

In this case, the market will underproduce relative to the efficient level.

- Consumer surplus will be lower from a higher  $P_d$
- Producer surplus will be lower from a lower  $P_s$
- The government will receive some revenue from the tax, \$6 per unit

Overall, the total surplus before the tax will be larger than the total surplus + tax revenue after the tax

- A **deadweight loss** (in total surplus) will be created

# Excise Tax

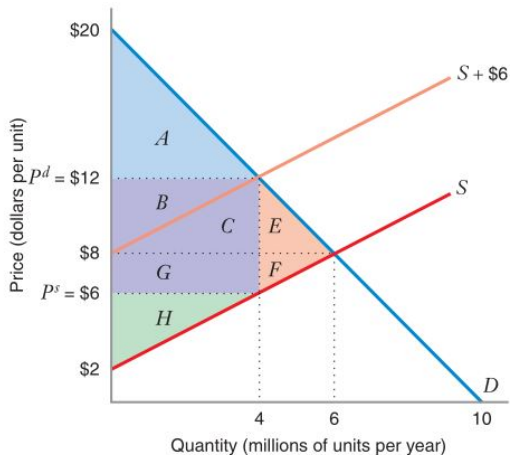
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# Excise Tax

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Economically, the deadweight loss from an excise tax is a result of forgone market transactions where the marginal benefit gained to the consumer would exceed the marginal cost to the producer.

# Excise Tax



## Before:

Total Surplus

$$= A + B + C + E + F + G + H$$

## After:

Consumer Surplus =  $A$

Producer Surplus =  $H$

Tax Revenue =  $B + C + G$

## Loss in Surplus:

Deadweight Loss =  $E + F$

# Excise Tax

Let's look at an example of the impact of an excise tax on the equilibrium quantity and price in a perfectly competitive market.

Suppose  $Q_d = 10 - 0.5P_d$  and  $Q_s = P_s - 2$ .

Without the tax, the market equilibrium is where  $Q_s = Q_d$ , and  $P_s = P_d$ .



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$$10 - 0.5P = P - 2 \Rightarrow 12 = 1.5P \Rightarrow P^* = 8$$

At the price  $P^* = 8$ , we have  $Q_s(8) = Q_d(8) = 6$  units.

## Try It Yourself

From the previous example, what is the producer surplus in the market, absent the tax?

## Excise Tax

Now suppose that the gov't imposes a tax of \$6. The market equilibrium is still where  $Q_s = Q_d$ , but  $P_s = P_d - 6$

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That is the price buyers pay. To calculate the price sellers receive,  $P_s^* = P_d^* - 6 = 12 - 6 = 6$ . Finally,  $Q_d = Q_s = P_s - 2 = 4$  units.

## Try It Yourself

From the previous example, what is the **change in** producer surplus resulting from the tax?

# Excise Tax

Note that with the imposition of the tax, 2 fewer units were sold.

- This means that there were two consumers whose WTP exceeded the marginal cost...
- ...that were no longer willing to buy the good after the tax.

The deadweight loss is due to these forgone transactions.

# Incidence of a Tax

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- The price received by sellers fell by \$2

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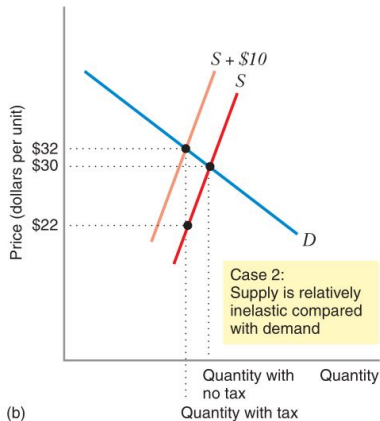
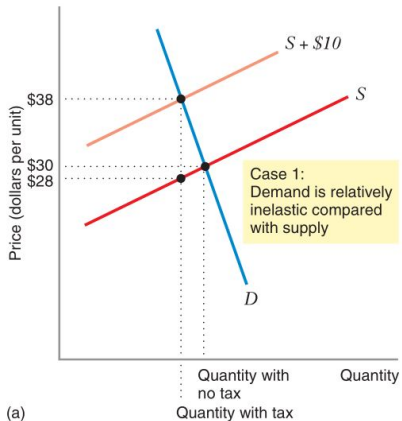
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In some sense, the consumers paid more of the tax than the sellers.

The **incidence of the tax** refers to the effect that the tax has on the prices that consumers pay and that sellers receive.

# Incidence of a Tax

*Who has the larger incidence in each example?*



# Incidence of a Tax

If demand is relatively *inelastic* compared to supply, then consumers are less sensitive to a price change

- the consumers will bear more of the burden of the tax

On the other hand, if demand is relatively *elastic* compared to supply

- the producers will bear more of the burden

The incidence of a tax does not depend on who the tax is levied on!

## Try It Yourself

Suppose that demand for sugary beverages is **perfectly inelastic**, and that supply is **relatively elastic**. What will the effect be of a \$3 tax on the price paid by consumers ( $P_d$ ), and the price received by sellers ( $P_s$ )? (Hint: Draw the supply and demand curves)

- A)  $P_d$  will increase by \$3, and  $P_s$  will not change
- B)  $P_d$  will not change, and  $P_s$  will decrease by \$3
- C)  $P_d$  will increase by \$1.50, and  $P_s$  decrease by \$1.50
- D)  $P_d$  will not change, and  $P_s$  will increase by \$3

# Subsidies

A subsidy can be thought of as a negative tax.

- When a subsidy of  $\$T$  is offered by the government, the effect is basically the opposite of a tax.

# Subsidies

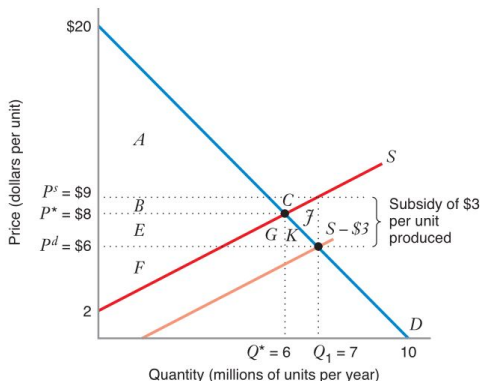
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- When a subsidy of  $\$T$  is offered by the government, the effect is basically the opposite of a tax.

The new market equilibrium will be such that  $P_s = P_d + \$T$

- The market will overproduce the good.
- Consumer surplus will be higher.
- Producer surplus will be higher.
- The government must spend money on the subsidy.
- A deadweight loss will be created.

# Subsidies



- The subsidies increases quantity to  $Q_1 = 7$
- Consumers pay \$2 less and producers receive \$1 more, so they're both happy
- The government pays \$3 per unit which outweighs the increase in surplus



# Subsidies

In this case, the deadweight loss is a result of the fact that gov't expenditures on the subsidy exceed the increase in total surplus

Economically, some consumers are encouraged to buy when the marginal cost to producers actually exceeds their marginal benefit, leading to negative total surplus.

# Price Ceilings

A **price ceiling** mandates that the price of a commodity cannot rise above a given level (e.g. rent controls).

- In order to be binding, the price ceiling must be below the market price.

In this case, the lower price results in lower quantity supplied, and higher quantity demanded

- And thus, a shortage is created (excess demand)

# Price Ceilings

As a result of a price ceiling, producer surplus will be lower because the

- the market price is lower
- textbfand some producers will exit the market

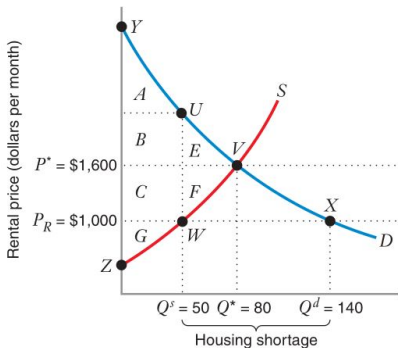
Some of that producer surplus will be transferred to consumer surplus (due to the lower price).

- However, some consumer surplus may be lost due to the lack of available supply (magnitude depends on who gets the existing supply).

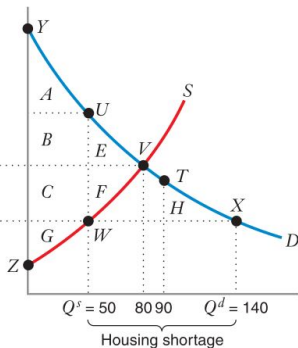
Finally, there will be deadweight loss due to foregone transactions.

# Price Ceilings

50 units are sold, but you don't know which consumers can buy it, hence consumer surplus is ambiguous

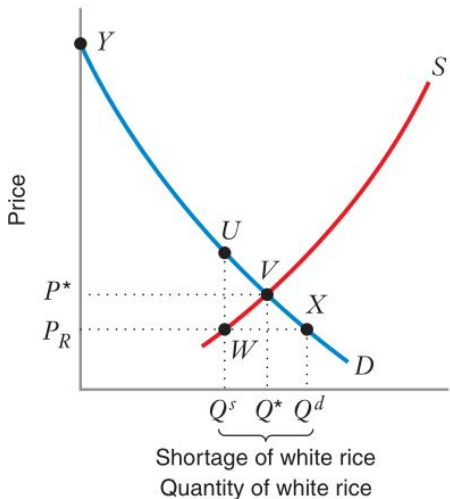


Case 1: Maximum consumer surplus



Case 2: Minimum consumer surplus

# Food Shortages in Venezuela



In 2003, Venezuela's president imposed price ceilings on many household goods as a result of inflation.

- By 2009, 400 food items had mandated price ceilings.
- Today, Venezuela is still plagued by food shortages as a result.

# Price Floors

A **price floor** mandates that the price of a commodity cannot fall below a given level.

- An example is a minimum wage.
- A price floor must be above the market price in order to be binding.

The result of a price floor is that quantity demanded falls, and quantity supplied rises.

- Yielding a surplus of the commodity (excess supply).

# Price Floors

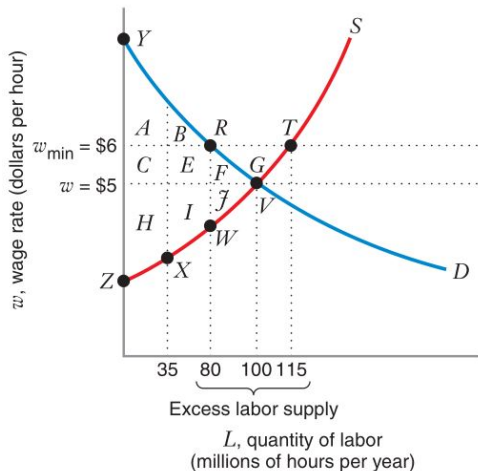
A price floor will lower consumer surplus:

- Some consumers will be forced out of the market
- **and** others will be paying a higher price than before.

Some of that will become producer surplus, as those producers are paid more.

But for those customers who are pushed out of the market, their consumer surplus disappears creating deadweight loss

# Price Floors



- At the minimum wage of \$6, 115 units of labor will be supplied but only 80 units will be demanded (excess supply)
- Therefore, only 80 units will be bought at a price of \$6
- The deadweight loss  

$$= F + J$$



## Try It Yourself

Which of the following statements is false?

- A) With a price floor, the market will not clear.
- B) With a price floor, consumers will buy less of the good than they would in a free market.
- C) With a price floor, producer surplus will always increase.
- D) With a price floor there will be excess supply.

# Conclusion

In the previous few chapters, we defined a perfectly competitive market, and analyzed the implications of our assumptions.

- We also looked at a few applications of perfectly competitive markets

In the next few chapters, we will relax some of those assumptions, and look at markets that are not perfectly competitive.

- For example, monopolies and oligopolies.

Time permitting, we will also consider scenarios where perfectly competitive markets fail to maximize social welfare (total surplus) due to externalities.